TE Update

MISSOURI DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION

MISSOURI TSA

Issue 32

September 2005

"Back To School Issue"

Technology Education and Related Information

Here's an opportunity to get some recognition for your students and program. ITEA will post one *"Picture of the Week"* on its homepage each week. Submit a photo from your classroom of student(s) actively learning about technology. Include a short description of the activity being depicted in the photo and the school, city and state.

Photos can be submitted electronically to kdelapaz@iteaconnect.org or mailed to ITEA, Attention: Kati de la Paz, 1914 Association Drive, Suite 201, Reston, VA 20191. Please note that hard copy photos will not be returned. It is preferable that photos have a minimum resolution of 300 dpi.

Photos in which students appear must have a Photo Release Form signed by a parent. ITEA reserves the right to use photographs in future ITEA publications.

Gain recognition for your program—thousands of people each month visit the ITEA Web site each month! Photos can be seen online at http://www.iteaconnect.org/PhotoOp.htm.

MUSEUM OF SCIENCE BUILDS NATIONAL CENTER FOR TECHNOLOGICAL LITERACY (NCTL)

BOSTON, MA -- Research indicates that most Americans don't understand the technologies that surround them — the products and systems designed to fill a specific need. From water filtration to wheel chairs, from pens to PDAs, people use technology often without fully comprehending how these tools are designed, developed, and function. In response, the Museum of Science, Boston, has launched the National Center for Technological Literacy (NCTL) to enhance knowledge of technology nationwide, and inspire the next generation of engineers, designers, inventors, and innovators. NCTL works closely with educators, administrators, government officials, and industry leaders to integrate engineering as a new discipline in schools and to present technology as an equal partner to science. The web address is www.nctl.org.

National Center for Technological Literacy

Museum of Science, Boston

The Museum's president and director, Ioannis (Yannis) Miaoulis, former Dean of Tufts University's School of Engineering, is the founder of and strong advocate for NCTL and its mission. "NCTL will play an important role in expanding and advancing technological literacy in the United States. In addition to creating new exhibits and programs to foster learning about technology and engineering in museums and science centers, we will generate programs and materials to enhance curricula in schools, introduce or modify academic standards, and provide training and support for educators."

Through its link with the Museum of Science, the NCTL encompasses a myriad of innovative programs and services including:

- **Advocacy and Standard Development** – NCTL leadership and staff collaborate with state education leaders, industry and policy makers to help states introduce or modify technology and engineering standards.

- **Educator Resource Center (ERC)** – A collection of technology and engineering curricular materials evaluated to determine how well they meet state and national technology and engineering standards housed in the Museum's Lyman Library and online at www.mos.org/erc.

- **Elementary School and After-School Materials** – The "Engineering is Elementary: Engineering and Technology Lessons for Children," is a series of 20 storybooks featuring multi-cultural children confronted with an engineering challenge, based on popular science topics, and aligned with a field of engineering. The story books and teacher materials are available at www.mos.org/eie.

- **High School Materials** – The "Engineering the Future: Designing the World of the 21st Century," is a full-year, introductory engineering course, suitable for students in grades 9-12. The course provides a strong foundation in physics and offers students an opportunity to explore the social, historical, and environmental contexts of emerging technologies. More information can be found at www.mos.org/etf.

- **Teacher Professional Development** – NCTL staff work in partnership with local and state organizations to provide professional development for teachers and teacher educators about core technology and engineering concepts, how to effectively communicate these to other teachers and how to structure and run workshops.

- **Power Up! Workshops and Programs** – A professional development partnership between educators and industry that explores energy technologies, creates collaborative models, curriculum enhancements, and project-based content for coursework in high schools and community colleges, nationwide.

SEIMENS WESTINGHOUSE COMPETITION IN MATH, SCIENCE AND TECHNOLOGY For more than 100 years, the Museum of Science has demonstrated a strong commitment to making science and mathematics accessible and relevant to the public. With the establishment of NCTL, the Museum will expand its efforts throughout the United States while helping to educate our citizens about technology and engineering and the role they play in society.

Registration for the 2005-06 Siemens Westinghouse Competition in Math, Science, & Technology has begun. A signature program of the New Jersey-based Siemens Foundation, the Siemens Westinghouse Competition is a research-based science and math competition for high school students administered by the College Board. The competition awards college scholarships ranging from $1,000 to $100,000. Students may enter as individuals or as part of a team. Entries are judged at the regional level by scientists and faculty at six leading research universities: Carnegie Mellon University; University of Notre Dame; University of California, Berkeley; Massachusetts Institute of Technology; Georgia Institute of Technology; and The University of Texas at Austin. The national finals are judged by a panel of prominent scientists and mathematicians.

The Siemens Westinghouse Competition attracts entries from high school science and math students throughout the country. The Foundation is dedicated to increasing access to higher education for gifted students in science, mathematics, and technology-related disciplines. Established in 1998, the Siemens Foundation recognizes and supports America's most promising science and mathematics students and teachers, as well as schools that are doing the most to promote education in the core sciences. For more information, visit www.siemens-foundation.org/competition.

Career Education Mentoring Program. The Career Education Mentoring Program completed another successful year with 248 protégés and 231 mentors participating. Guidance counselors were included for the first time. During the upcoming school year, the Department's guidance staff will be working on a mentoring program in conjunction with the Missouri School Counselor's Association which complements the existing division program.

September 19 and 20 will be the kickoff for this year's Career Education Mentoring Program. Barry Sweeney, a national expert on mentoring, will be the featured presenter. Mentors will complete a half-day of training prior to being joined by their protégés during evening team building activities. The application form and more information at: http://dese.mo.gov/divcareered/mentoring_program.htm.

High Quality Professional Development Model, The MCCE (Missouri Center for Career Education) was awarded the DESE contract to develop several regional workshops around the state to provide specific training on the Exploring Careers Curriculum Model. Technology Education content area will be the first utilize the regional professional development workshops. You will find the philosophy, rationale, scope and sequence within the Exploring Careers through Technology Education curriculum. For more information, contact Ben Yates via email byates@cmsu1.cmsu.edu or by phone number (660) 543-4304

FALL WORKSHOP SITES	HOST TEACHER	SESSION DATES
Lafayette Co. High School Higginsville	Steve Goodman	Sept. 24 Oct. 29 Nov. 19
Busch Academic Athletic Academy St. Louis	John Petsch	Sept. 28 Oct. 26 Nov. 30
Lafayette High School St. Joseph	Vince Crowley Tom Toalson	Oct. 8 Nov. 12 Dec. 10
Marshfield High School Marshfield	Steve Spicher	Oct. 15 Nov. 5 Dec. 3
SPRING WORKSHOP SITES	**HOST TEACHER**	**SESSION DATES**
Iberia High School Iberia	Walt Pollard	Jan. 26 Feb. 13 Mar. 13
Troy Buchanan High School Troy	Ted Wilkinson	Jan. 21 Feb. 25 Mar. 18
Chillicothe Middle School Chillicothe	John DeBey	Jan. 28 Feb. 18 Apr. 1

Project Lead The Way (PLTW) – We now have 33 schools that are currently offering the program or implementing the program this coming fall. The University of Missouri-Rolla will be our Missouri PLTW State Affiliate Leader in collaboration with Central Missouri State University and St. Louis Community College will be responsible for coordinating our state leadership team, summer teacher institute and college credit for all Missouri students and teachers. For more information about PLTW go to: http://dese.mo.gov/divcareered/pltw_network.htm.

Kuder — We are pleased to announce that funding to renew the Missouri Career Planning System, powered by Kuder, has been secured through the Missouri Higher Education Loan Authority (MOHELA) and the Missouri Department of Education. This statewide initiative is for all Missouri students, grades 7-14 in public schools, to access customized, on-line career assessment and planning resources.

Many major enhancements are being added to the Kuder system over the summer including occupational comparison and a scholarship search feature. The administrative database will have a new look and more intuitive navigation as well as standard Quick Reports, the ability to reset student passwords, and more. Enhancement details will be coming in August, so please watch your e-mail and the announcement section of your administrative database for additional information.

FUNDING OPPORTUNITIES

- **Sam Walton Community Scholarship: *Reaching Out to the Community*** –
  Each operating Wal-Mart Store and SAM'S CLUB is eligible to award two $1,000 scholarships to qualifying local high school seniors. Students must be graduating high school seniors and can not be an Associate or the child/dependent of an Associate of Wal-Mart Stores, Inc. This award is used for the student's freshman year tuition, books, fees and on-campus room and board at an approved, accredited U.S. college or university. Apply between November 1, 2005 and February 1, 2006. Funding is $1000 per award. High School Seniors living in a community with a Wal-Mart store. Contact Community Involvement Coordinator at local Wal-Mart or Sam's Club store, or Scholarship Program Administrator at (800) 914-8385. You may visit the website at http://www.walmartfoundation.org/wmstore/goodworks/scripts/index.jsp.

- **Coca Cola Scholars Foundation: *Awarding Hard Working Students*** – Coca-Cola is awarding scholarships based on character, personal merit and commitment. Merit is demonstrated through leadership in school, civic and extracurricular activities, academic achievement, and motivation to serve and succeed. Timeline to apply is from September 1, 2005 through October 31, 2005. Fifty (50) awards for $20,000 over a four-year period and 200 awards for $4,000 over a four-year period will be funded. A current high school or home-school senior carrying a minimum 3.00 GPA at the end of their junior year of high school is eligible to apply. For information, you may visit the website at https://www.coca-colascholars.org/cokeWeb/jsp/scholars/Index.jsp.

- **Aerospace Education Foundation (AEF)** – AEF's Educator Grant program is designed to promote aerospace education activities in classrooms from kindergarten through twelfth grades. The program encourages development of innovative aerospace activities within the prescribed curriculum. The program also encourages establishing an active relationship between the school and the local Air Force Association organization. Visit http://www.aef.org/aid/educator.pdf for information.

- **Mix It Up Mini-Grants: *Crossing Social Boundaries*** –The Mix It Up project was created to help support students in their efforts to cross social boundaries within their schools and out in the community. The goal of the grant program is to have projects created and put into practice by students that focus on promoting collaborations that cross social boundaries. The project or program should be a part of an ongoing effort, or an effort that's just getting started, but will continue. $500 per award will be granted. Deadline for applications is ongoing. Programs directed by youths who have the assistance of adult allies are eligible to apply. Youth groups, clubs, and community groups are encouraged to work together to reach the goal of the program. For information, contact Mix It Up Grants, 400 Washington Avenue, Montgomery, AL 36104. You may visit the website at http://www.tolerance.org/teens/stories/article.jsp?p=0&ar=149.

- **Constitutional Rights Foundation Mini-Grant Program: *Assisting Students Serving the Community*** **–**designed to provide mini-grants to K-12 service-learning projects that address serious community issues. Students will learn about hunger, environment, poverty, crime, and aging. They will also be exposed to mentoring, problem-solving, and citizenship skills through participation in these projects. Projects may be completed either in school or in the community and should focus on a critical community need. Proposals will be judged on involvement with more than one local agency; showing diversity among the participating students (such as age, gender, ability, ethnicity); and/or providing matching funds or in-kind donations from other community organizations. Deadline for applications is October 14, 2005. Funding is for awards up to $500. K-12 schools and community organizations that work with K-12 youth are eligible to apply. For information, contact Katie Moore, Robinson Mini-Grant Program, Constitutional Rights Foundation, 601 S. Kingsley Drive, Los Angeles, CA 90005, (213) 316-2104, email: Katie@crf-usa.org. You may visit the website at http://www.crf-usa.org/network/crf_robin.html.

- **School, Home and Office Products Association (SHOPA) Kids in Need Foundation Teacher Grants: *Recognizing Exceptional Teachers*** **–** provides K-12 educators with funding to help them realize their dreams of providing innovative learning opportunities for their students. The SHOPA Kids In Need Foundation helps to engage students in the learning process by supporting our most creative and important educational resource — our nation's teachers. Deadline for applications is September 30, 2005. 170-200 grants ranging from $100 - $500 will be awarded. Winning projects are put in the form of lesson plans and are published as a *Best Practices Guide* which is distributed to other teachers through the Kids in Need Resource Centers and from the Foundation office. Certified K-12 teachers are eligible to apply. Lesson plans are judged according to their innovativeness and merit, clarity of objectives, replication feasibility, suitability of evaluation methods, and cost effectiveness. For information, visit the website at http://www.shopa.org/shopa_foundation/teacher_programs.php.

- **Toshiba America Foundation: *Enhancing Classroom Teaching* –** encourages programs, projects, and activities which have the potential to improve classroom teaching in science and mathematics. They have a strong focus on projects designed to increase awareness of the environment. There is no deadline for grants for 7th through 12th grade programs seeking less than $5,000. Requests for more than $5,000 must be received by August 1, 2005, for September consideration. K-6th grade programs seeking funding are due October 1, 2005. Applicants are strongly encouraged to contact the foundation before or during the proposal preparation process. Funding varies. Public and private schools are eligible to apply. For more information, contact (212) 596-0620 or visit the website at http://www.toshiba.com/taf/.

Curriculum

ITEA—CATTS (Center for Advancing the Teaching of Technology and Science—
The Center to Advance the Teaching of Technology & Science (CATTS) was established in 1998 to strengthen professional development and advance technological literacy. CATTS initiatives are directed toward four goals: development of standards-based curricula; teacher enhancement; research concerning teaching and learning; and curriculum implementation and diffusion.

Because Missouri was a CATTS Consortium member in the years shown on the web link below, the CATTS materials developed in those years are provided here for use in promoting technological literacy. These links are for your convenience and are not intended to be shared with others outside of Missouri. However, you may copy these resources to a CD or print them for dissemination to teachers and others within Missouri. For more information go to: http://www.iteaconnect.org/CATTSresources/CATTSresourcesMO01.html.

Technology Education TSA National Curriculum! After several years of development and field-testing in technology classrooms, TECHKnow is now available. TECHKnow was written by, and for, Technology Teachers and their classroom. The TECHKnow Project consists of 20 units of study, carefully incorporating the Standards for Technological Literacy and all of the units correspond to TSA Competitive Events. Ten units were developed for Middle School and 10 units for the High School level. One book containing 5 units for the Middle School, and one book containing 5 units for the High School, will be available for the 2004-2005 school year. The second book for each level will be available late summer of 2005. For more information go to http://www.cplearning.com/

Missouri TSA

Announcing, A New National TSA Mentoring Program! The Mentor Program is an opportunity for you and your chapter to develop a friendship with another TSA chapter, use leadership skills in providing assistance, and to pass along ideas and tips that have helped strengthen your chapter. If you have had a TSA chapter for more than a year, we invite you to become a Mentor chapter. For more information go to http://www.tsaweb.org/get.php?page=/membership/mentor.html.

8th Annual Fall Leadership Connections Conference – The 8th Annual Missouri TSA Fall Leadership Connections Conference, October 20-22, 2005, Ramada Inn of Jefferson City, MO promises to be fun and exciting. The State Officer team has spent many hours in preparation to make this year one of the best ever! You will want to make plans now to be a part of this rewarding event.

The benefits of bringing your chapter officers to this conference will provide your student leaders the opportunity to develop your leadership skills and network with other Technology Education teachers and students from across the state. For more information about Fall Leadership Connections Conference go to: http://dese.mo.gov/divcareered/tsa_fall_leadership_conference.htm.

Leadership Connections Degree Program – There is a self-study degree program available on-line to all Missouri TSA students. Students will find the content, requirements, practice test and the application needed to receive the respective award. They are progressive and the first degree is the "Basic Degree" which is earned at our Annual Fall Leadership Connections Conference. The second degree is the "Academic Degree", the third degree is the "Collegiate Degree" and the fourth degree is the "Scholar Degree". These degrees are available for all Missouri TSA members who have completed of the respective requirements. For more information go to: http://www.dese.state.mo.us/divvoced/tsa_lcdp.htm

Are You Planning to Start a TSA Chapter? Then you should begin by reviewing the "10 Steps To Starting a Chapter" found on our website at: http://dese.mo.gov/divcareered/tsa_information.htm. I would encourage you to plan to attend the "Missouri TSA Fall Leadership Connections Conference" in early October with your officers or officers to be. This conference will train your officers in every aspect of what they need to run your TSA chapter and how to work together as a team. You can learn more about all of our conferences at http://dese.mo.gov/divcareered/tsa_student_conferences.htm. You can find information about the yearly affiliation of your members at http://dese.mo.gov/divcareered/tsa_members.htm.

TSA Chapter Affiliation Forms and Dues You can find the chapter affiliation form to register your chapter for the 2005-2006 school year at: http://dese.mo.gov/divcareered/tsa_membership_information.htm. There are a few changes that will need to make note of in regards to the dues. National Individual dues will be $9 and CAP dues will be a flat rate of $350 with NO discounts for multiple schools. Missouri dues are still the same with individual dues at $3 and CAP at $115.

Technology Education Resources

New Technology Education Scope and Sequence Technology Education available online, scope and sequence map will provide a quick summary of program expectations for Technology Education programs across the state. The map is designed to serve as a companion to the new Missouri Technology Education Guide and the Program Standards for program improvement and alignment. In addition, each document supports the Technology Education Grant Awards Program that can be utilized by schools to support program improvement efforts.

Missouri Technology Education Guide (version 2.2) – A Newly Revised copy of the MOTE Guide has been posted to our web site with a complete revision of chapter 3 on the Technology Education Scope and Sequence. You can view or download the latest version at http://dese.mo.gov/divcareered/teched_curriculum.htm. You will notice on the "Curriculum" web site that we have created separate document of each chapter for quicker download and use. In addition, you can still download and review the complete guide that has interactive links embedded throughout the guide for accessing all of the ITEA elementary, middle school and high school curriculum developed by ITEA and the CATTS consortium. If you have questions about the guide, you can contact Doug Miller at W.Doug.Miller@dese.mo.gov.

ICON -- or the **Innovation Curriculum Online Network**, is a central source for information dealing with technology and innovation, and serves as an electronic roadmap to connect users, such as teachers, professors, students, museum staff, and parents with information about the human built and innovated world.

ICON also provides a broad and deep collection of technological literacy resources for teachers and educators, digital resources informed by educational and digital library standards, necessary descriptors, metadata, and developmentally appropriate content for technological literacy support. The collection is populated and classified according to the Standards for Technological Literacy.

2005-2006 Program of Activities (Calendar)

September 2005

1	Thursday	Fiscal Membership Year Begins
10	Saturday	TSA's Official 27th Anniversary
19	Monday	Missouri TSA Fall Leadership Connections Conference On-Line registration open
22	Thursday	National School Scene (Fall Issue) posting TSA Today (Fall Issue) posting

October 2005

1	Saturday	TEAM Fall Conference and Executive Board meeting, CMSU, Warrensburg, MO
20-22	Thursday – Saturday	Annual Fall Leadership Connections Conference, Jefferson City, Ramada Inn.

November 2005

1	Tuesday	School Scene (Winter Issue) Deadline Missouri TSA Today Newsletter articles Due at State Office
4	**Friday**	**Chapter Affiliations – Priority membership due to National TSA (includes state dues)**
4	Friday	State Leadership Team Meeting, Jefferson City, MO, Governors Office Building Rooms 315 — 316

December 2005

8-10	Thursday - Saturday	ACTE Conference, New Orleans, LA

January 2006

2	Monday	TE GAP RFGA for FY-2007 posted to the web
3	Tuesday	School Scene (Winter Issue) Posting TE GAP FY-2006 Mid Year Report form due
9	Monday	State Officer Candidate Filing Form Due
27	Friday	State Leadership Team Meeting — TSA BOD meeting — State Officer Candidate Interviews Jefferson City, MO, Governors Office Building, Rooms 315 — 316

February 2006

1	Wednesday	DEADLINE FOR CHAPTER AFFILIATIONS
1	Wednesday	School Scene (Spring Issue) deadline All Missouri TSA Awards Recognition applications are due Missouri TSA Today Newsletter articles due at State Office
TBA		TSO Governor's Proclamation Signing
6	Monday	National TSA Conference Information posted to web site
6-10	Monday - Friday	Career and Technical Education Week
10	Friday	School Scene (Spring Issue) Posted On-Line
20-24	Monday – Friday	National Engineers Week

March 2006

11	Monday	TSA State Conference On-Line Registration Open
29	Tuesday	School Scene (spring issue) Posting TSA Today (spring issue) Posting
23-25	Thursday - Saturday	ITEA Conference, Baltimore, MD
31		TE GAP FY-2007 Application due

April 2006

5	Friday	National Officer Candidate application due to state advisor
6-8	Thursday - Saturday	Missouri TSA State Leadership & Career Development Conference Missouri TSA BOD meeting CMSU, Warrensburg, MO
11	Tuesday	Deadline for White Star Chapter recognition
17-21	Monday - Friday	National Student Leadership Week
24-28	Monday - Friday	National TSA Week

May 2006

1	Monday	TE GAP FY-2006 FV-2 Form due
1	Monday	Postmark date for the following applications and nominations are due to National TSA: ▪ Gold Achievement Program ▪ American Spirit Award ▪ Air Force Recruiting Salutes Award ▪ National officer candidate applications ▪ State Superlative Awards ▪ National Award and Recognition Program
12	Friday	TE GAP FY-2006 Final Progress Report Form due
19	Friday	Conference registration materials and fees due to National TSA (Copy faxed to State Advisor required)

June 2006

5	Monday	National Officer candidate notification eligibility
5-9	Tuesday - Friday	2006-2007 State Officer Training (Required)
21-25	Wednesday--Sunday	28th Annual TSA Conference, Dallas, TX

July 2006

24-26	Monday-Wednesday	Annual Missouri ACTE Summer Conference ▪ TSA Board of Directors meeting ▪ TSA All Advisors Meeting

Thoughts for Consideration

New York Times April 3, 2005
By THOMAS L. FRIEDMAN

In 1492 Christopher Columbus set sail for India, going west. He had the Nina, the Pinta and the Santa Maria. He never did find India, but he called the people he met ''Indians'' and came home and reported to his king and queen: ''The world is round.'' I set off for India 512 years later. I knew just which direction I was going. I went east. I had Lufthansa business class, and I came home and reported only to my wife and only in a whisper: ''The world is flat.''

And therein lies a tale of technology and geoeconomics that is fundamentally reshaping our lives -- much, much more quickly than many people realize. It all happened while we were sleeping, or rather while we were focused on 9/11, the dot-com bust and Enron -- which even prompted some to wonder whether globalization was over. Actually, just the opposite was true, which is why it's time to wake up and prepare ourselves for this flat world, because others already are, and there is no time to waste.

I wish I could say I saw it all coming. Alas, I encountered the flattening of the world quite by accident. It was in late February of last year, and I was visiting the Indian high-tech capital, Bangalore, working on a documentary for the Discovery Times channel about outsourcing. In short order, I interviewed Indian entrepreneurs who wanted to prepare my taxes from Bangalore, read my X-rays from Bangalore, trace my lost

luggage from Bangalore and write my new software from Bangalore. The longer I was there, the more upset I became -- upset at the realization that while I had been off covering the 9/11 wars, globalization had entered a whole new phase, and I had missed it. I guess the eureka moment came on a visit to the campus of Infosys Technologies, one of the crown jewels of the Indian outsourcing and software industry.

Nandan Nilekani, the Infosys C.E.O., was showing me his global video-conference room, pointing with pride to a wall-size flat-screen TV, which he said was the biggest in Asia. Infosys, he explained, could hold a virtual meeting of the key players from its entire global supply chain for any project at any time on that supersize screen. So its American designers could be on the screen speaking with their Indian software writers and their Asian manufacturers all at once. That's what globalization is all about today, Nilekani said. Above the screen there were eight clocks that pretty well summed up the Infosys workday: 24/7/365. The clocks were labeled U.S. West, U.S. East, G.M.T., India, Singapore, Hong Kong, Japan, Australia.

''Outsourcing is just one dimension of a much more fundamental thing happening today in the world,'' Nilekani explained. ''What happened over the last years is that there was a massive investment in technology, especially in the bubble era, when hundreds of millions of dollars were invested in putting broadband connectivity around the world, undersea cables, all those things.'' At the same time, he added, computers became cheaper and dispersed all over the world, and there was an explosion of e-mail software, search engines like Google and proprietary software that can chop up any piece of work and send one part to Boston, one part to Bangalore and one part to Beijing, making it easy for anyone to do remote development. When all of these things suddenly came together around 2000, Nilekani said, they ''created a platform where intellectual work, intellectual capital, could be delivered from anywhere.

It could be disaggregated, delivered, distributed, produced and put back together again -- and this gave a whole new degree of freedom to the way we do work, especially work of an intellectual nature. And what you are seeing in Bangalore today is really the culmination of all these things coming together.''

At one point, summing up the implications of all this, Nilekani uttered a phrase that rang in my ear. He said to me, ''Tom, the playing field is being leveled.'' He meant that countries like India were now able to compete equally for global knowledge work as never before -- and that America had better get ready for this. As I left the Infosys campus that evening and bounced along the potholed road back to Bangalore, I kept chewing on that phrase: ''The playing field is being leveled.''

''What Nandan is saying,'' I thought, ''is that the playing field is being flattened. Flattened? Flattened? My God, he's telling me the world is flat!'' Here I was in Bangalore -- more than 500 years after Columbus sailed over the horizon, looking for a shorter route to India using the rudimentary navigational technologies of his day, and returned safely to prove definitively that the world was round -- and one of India's smartest engineers, trained at his country's top technical institute and backed by the most modern technologies of his day, was telling me that the world was flat, as flat as that screen on which he can host a meeting of his whole global supply chain. Even more interesting, he was citing this development as a new milestone in human progress and a great opportunity for India and the world -- the fact that we had made our world flat!

This has been building for a long time. Globalization 1.0 (1492 to 1800) shrank the world from a size large to a size medium, and the dynamic force in that era was countries globalizing for resources and imperial conquest. Globalization 2.0 (1800 to 2000) shrank the world from a size medium to a size small, and it was spearheaded by companies globalizing for markets and labor. Globalization 3.0 (which started around 2000) is shrinking the world from a size small to a size tiny and flattening the playing field at the same time. And while the dynamic force in Globalization 1.0 was countries globalizing and the dynamic force in Globalization 2.0 was companies globalizing, the dynamic force in Globalization 3.0 -- the thing that gives it its unique character -- is individuals and small groups globalizing. Individuals must, and can, now ask: where do I fit into the global competition and opportunities of the day, and how can I, on my own, collaborate with others globally? But Globalization 3.0 not only differs from the previous eras in how it is shrinking and flattening the world and in how it is empowering individuals. It is also different in that Globalization 1.0 and 2.0 were driven primarily by European and American companies and countries. But going forward, this will be less and less true. Globalization 3.0 is not only going to be driven more by individuals but also by a much more diverse -- non-

Western, nonwhite -- group of individuals. In Globalization 3.0, you are going to see every color of the human rainbow take part.

''Today, the most profound thing to me is the fact that a 14-year-old in Romania or Bangalore or the Soviet Union or Vietnam has all the information, all the tools, all the software easily available to apply knowledge however they want,'' said Marc Andreessen, a co-founder of Netscape and creator of the first commercial Internet browser. ''That is why I am sure the next Napster is going to come out of left field. As bioscience becomes more computational and less about wet labs and as all the genomic data becomes easily available on the Internet, at some point you will be able to design vaccines on your laptop.''

Andreessen is touching on the most exciting part of Globalization 3.0 and the flattening of the world: the fact that we are now in the process of connecting all the knowledge pools in the world together. We've tasted some of the downsides of that in the way that Osama bin Laden has connected terrorist knowledge pools together through his Qaeda network, not to mention the work of teenage hackers spinning off more and more lethal computer viruses that affect us all. But the upside is that by connecting all these knowledge pools we are on the cusp of an incredible new era of innovation, an era that will be driven from left field and right field, from West and East and from North and South. Only 30 years ago, if you had a choice of being born a B student in Boston or a genius in Bangalore or Beijing, you probably would have chosen Boston, because a genius in Beijing or Bangalore could not really take advantage of his or her talent. They could not plug and play globally. Not anymore. Not when the world is flat, and anyone with smarts, access to Google and a cheap wireless laptop can join the innovation fray.

When the world is flat, you can innovate without having to emigrate. This is going to get interesting. We are about to see creative destruction on steroids. How did the world get flattened, and how did it happen so fast? It was a result of 10 events and forces that all came together during the 1990's and converged right around the year 2000. Let me go through them briefly. The first event was 11/9. That's right -- not 9/11, but 11/9. Nov. 9, 1989, is the day the Berlin Wall came down, which was critically important because it allowed us to think of the world as a single space. ''The Berlin Wall was not only a symbol of keeping people inside Germany; it was a way of preventing a kind of global view of our future,'' the Nobel Prize-winning economist Amartya Sen said. And the wall went down just as the windows went up -- the breakthrough Microsoft Windows 3.0 operating system, which helped to flatten the playing field even more by creating a global computer interface, shipped six months after the wall fell.

The second key date was 8/9. Aug. 9, 1995, is the day Netscape went public, which did two important things. First, it brought the Internet alive by giving us the browser to display images and data stored on Web sites. Second, the Netscape stock offering triggered the dot-com boom, which triggered the dot-com bubble, which triggered the massive overinvestment of billions of dollars in fiber-optic telecommunications cable. That overinvestment, by companies like Global Crossing, resulted in the willy-nilly creation of a global undersea-underground fiber network, which in turn drove down the cost of transmitting voices, data and images to practically zero, which in turn accidentally made Boston, Bangalore and Beijing next-door neighbors overnight. In sum, what the Netscape revolution did was bring people-to-people connectivity to a whole new level. Suddenly more people could connect with more other people from more different places in more different ways than ever before.

No country accidentally benefited more from the Netscape moment than India. ''India had no resources and no infrastructure,'' said Dinakar Singh, one of the most respected hedge-fund managers on Wall Street, whose parents earned doctoral degrees in biochemistry from the University of Delhi before emigrating to America. ''It produced people with quality and by quantity. But many of them rotted on the docks of India like vegetables. Only a relative few could get on ships and get out. Not anymore, because we built this ocean crosser, called fiber-optic cable. For decades you had to leave India to be a professional. Now you can plug into the world from India. You don't have to go to Yale and go to work for Goldman Sachs.'' India could never have afforded to pay for the bandwidth to connect brainy India with high-tech America, so American shareholders paid for it. Yes, crazy overinvestment can be good. The overinvestment in railroads turned out to be a great boon for the American economy. ''But the railroad overinvestment was confined to your own country and so, too, were the

benefits," Singh said. In the case of the digital railroads, "it was the foreigners who benefited." India got a free ride.

The first time this became apparent was when thousands of Indian engineers were enlisted to fix the Y2K -- the year 2000 -- computer bugs for companies from all over the world. (Y2K should be a national holiday in India. Call it "Indian Interdependence Day," says Michael Mandelbaum, a foreign-policy analyst at Johns Hopkins.) The fact that the Y2K work could be outsourced to Indians was made possible by the first two flatteners, along with a third, which I call "workflow." Workflow is shorthand for all the software applications, standards and electronic transmission pipes, like middleware, that connected all those computers and fiber-optic cable. To put it another way, if the Netscape moment connected people to people like never before, what the workflow revolution did was connect applications to applications so that people all over the world could work together in manipulating and shaping words, data and images on computers like never before.

Indeed, this breakthrough in people-to-people and application-to-application connectivity produced, in short order, six more flatteners -- six new ways in which individuals and companies could collaborate on work and share knowledge. One was "outsourcing." When my software applications could connect seamlessly with all of your applications, it meant that all kinds of work -- from accounting to software-writing -- could be digitized, disaggregated and shifted to any place in the world where it could be done better and cheaper. The second was "offshoring." I send my whole factory from Canton, Ohio, to Canton, China. The third was "open-sourcing." I write the next operating system, Linux, using engineers collaborating together online and working for free. The fourth was "insourcing." I let a company like UPS come inside my company and take over my whole logistics operation -- everything from filling my orders online to delivering my goods to repairing them for customers when they break. (People have no idea what UPS really does today. You'd be amazed!). The fifth was "supply-chaining." This is Wal-Mart's specialty. I create a global supply chain down to the last atom of efficiency so that if I sell an item in Arkansas, another is immediately made in China. (If Wal-Mart were a country, it would be China's eighth-largest trading partner.) The last new form of collaboration I call "informing" -- this is Google, Yahoo and MSN Search, which now allow anyone to collaborate with, and mine, unlimited data all by themselves.

So the first three flatteners created the new platform for collaboration, and the next six are the new forms of collaboration that flattened the world even more. The 10th flattener I call "the steroids," and these are wireless access and voice over Internet protocol (VoIP). What the steroids do is turbocharge all these new forms of collaboration, so you can now do any one of them, from anywhere, with any device.

The world got flat when all 10 of these flatteners converged around the year 2000. This created a global, Web-enabled playing field that allows for multiple forms of collaboration on research and work in real time, without regard to geography, distance or, in the near future, even language. "It is the creation of this platform, with these unique attributes, that is the truly important sustainable breakthrough that made what you call the flattening of the world possible," said Craig Mundie, the chief technical officer of Microsoft. No, not everyone has access yet to this platform, but it is open now to more people in more places on more days in more ways than anything like it in history.

Wherever you look today -- whether it is the world of journalism, with bloggers bringing down Dan Rather; the world of software, with the Linux code writers working in online forums for free to challenge Microsoft; or the world of business, where Indian and Chinese innovators are competing against and working with some of the most advanced Western multinationals -- hierarchies are being flattened and value is being created less and less within vertical silos and more and more through horizontal collaboration within companies, between companies and among individuals.

Do you recall "the IT revolution" that the business press has been pushing for the last 20 years? Sorry to tell you this, but that was just the prologue. The last 20 years were about forging, sharpening and distributing all the new tools to collaborate and connect. Now the real information revolution is about to begin as all the complementarities among these collaborative tools start to converge. One of those who first called this moment by its real name was Carly Fiorina, the former Hewlett-Packard C.E.O., who in 2004 began to declare in her

public speeches that the dot-com boom and bust were just "the end of the beginning." The last 25 years in technology, Fiorina said, have just been "the warm-up act." Now we are going into the main event, she said, "and by the main event, I mean an era in which technology will truly transform every aspect of business, of government, of society, of life."

As if this flattening wasn't enough, another convergence coincidentally occurred during the 1990's that was equally important. Some three billion people who were out of the game walked, and often ran, onto the playing field. I am talking about the people of China, India, Russia, Eastern Europe, Latin America and Central Asia. Their economies and political systems all opened up during the course of the 1990's so that their people were increasingly free to join the free market. And when did these three billion people converge with the new playing field and the new business processes? Right when it was being flattened, right when millions of them could compete and collaborate more equally, more horizontally and with cheaper and more readily available tools. Indeed, thanks to the flattening of the world, many of these new entrants didn't even have to leave home to participate. Thanks to the 10 flatteners, the playing field came to them!

It is this convergence -- of new players, on a new playing field, developing new processes for horizontal collaboration -- that I believe is the most important force shaping global economics and politics in the early 21st century. Sure, not all three billion can collaborate and compete. In fact, for most people the world is not yet flat at all. But even if we're talking about only 10 percent, that's 300 million people -- about twice the size of the American work force. And be advised: the Indians and Chinese are not racing us to the bottom. They are racing us to the top. What China's leaders really want is that the next generation of underwear and airplane wings not just be "made in China" but also be "designed in China." And that is where things are heading. So in 30 years we will have gone from "sold in China" to "made in China" to "designed in China" to "dreamed up in China" -- or from China as collaborator with the worldwide manufacturers on nothing to China as a low-cost, high-quality, hyperefficient collaborator with worldwide manufacturers on everything. Ditto India. Said Craig Barrett, the C.E.O. of Intel, "You don't bring three billion people into the world economy overnight without huge consequences, especially from three societies" -- like India, China and Russia -- "with rich educational heritages."

That is why there is nothing that guarantees that Americans or Western Europeans will continue leading the way. These new players are stepping onto the playing field legacy free, meaning that many of them were so far behind that they can leap right into the new technologies without having to worry about all the sunken costs of old systems. It means that they can move very fast to adopt new, state-of-the-art technologies, which is why there are already more cellphones in use in China today than there are people in America.

If you want to appreciate the sort of challenge we are facing, let me share with you two conversations. One was with some of the Microsoft officials who were involved in setting up Microsoft's research center in Beijing, Microsoft Research Asia, which opened in 1998 -- after Microsoft sent teams to Chinese universities to administer I.Q. tests in order to recruit the best brains from China's 1.3 billion people. Out of the 2,000 top Chinese engineering and science students tested, Microsoft hired 20. They have a saying at Microsoft about their Asia center, which captures the intensity of competition it takes to win a job there and explains why it is already the most productive research team at Microsoft: "Remember, in China, when you are one in a million, there are 1,300 other people just like you."

The other is a conversation I had with Rajesh Rao, a young Indian entrepreneur who started an electronic-game company from Bangalore, which today owns the rights to Charlie Chaplin's image for mobile computer games. "We can't relax," Rao said. "I think in the case of the United States that is what happened a bit. Please look at me: I am from India. We have been at a very different level before in terms of technology and business. But once we saw we had an infrastructure that made the world a small place, we promptly tried to make the best use of it. We saw there were so many things we could do. We went ahead, and today what we are seeing is a result of that. There is no time to rest. That is gone. There are dozens of people who are doing the same thing you are doing, and they are trying to do it better. It is like water in a tray: you shake it, and it will find the path of least resistance. That is what is going to happen to so many jobs -- they will go to that corner of the world where there is the least resistance and the most opportunity. If there is a skilled person in Timbuktu, he

will get work if he knows how to access the rest of the world, which is quite easy today. You can make a Web site and have an e-mail address and you are up and running. And if you are able to demonstrate your work, using the same infrastructure, and if people are comfortable giving work to you and if you are diligent and clean in your transactions, then you are in business."

Instead of complaining about outsourcing, Rao said, Americans and Western Europeans would "be better off thinking about how you can raise your bar and raise yourselves into doing something better. Americans have consistently led in innovation over the last century. Americans whining -- we have never seen that before."

Rao is right. And it is time we got focused. As a person who grew up during the cold war, I'll always remember driving down the highway and listening to the radio, when suddenly the music would stop and a grim-voiced announcer would come on the air and say: "This is a test. This station is conducting a test of the Emergency Broadcast System." And then there would be a 20-second high-pitched siren sound. Fortunately, we never had to live through a moment in the cold war when the announcer came on and said, "This is a not a test." That, however, is exactly what I want to say here: "This is not a test."

The long-term opportunities and challenges that the flattening of the world puts before the United States are profound. Therefore, our ability to get by doing things the way we've been doing them -- which is to say not always enriching our secret sauce -- will not suffice any more. "For a country as wealthy we are, it is amazing how little we are doing to enhance our natural competitiveness," says Dinakar Singh, the Indian-American hedge-fund manager. "We are in a world that has a system that now allows convergence among many billions of people, and we had better step back and figure out what it means. It would be a nice coincidence if all the things that were true before were still true now, but there are quite a few things you actually need to do differently. You need to have a much more thoughtful national discussion."

If this moment has any parallel in recent American history, it is the height of the cold war, around 1957, when the Soviet Union leapt ahead of America in the space race by putting up the Sputnik satellite. The main challenge then came from those who wanted to put up walls; the main challenge to America today comes from the fact that all the walls are being taken down and many other people can now compete and collaborate with us much more directly. The main challenge in that world was from those practicing extreme Communism, namely Russia, China and North Korea. The main challenge to America today is from those practicing extreme capitalism, namely China, India and South Korea. The main objective in that era was building a strong state, and the main objective in this era is building strong individuals.

Meeting the challenges of flatism requires as comprehensive, energetic and focused a response as did meeting the challenge of Communism. It requires a president who can summon the nation to work harder, get smarter, attract more young women and men to science and engineering and build the broadband infrastructure, portable pensions and health care that will help every American become more employable in an age in which no one can guarantee you lifetime employment.

We have been slow to rise to the challenge of flatism, in contrast to Communism, maybe because flatism doesn't involve ICBM missiles aimed at our cities. Indeed, the hot line, which used to connect the Kremlin with the White House, has been replaced by the help line, which connects everyone in America to call centers in Bangalore. While the other end of the hot line might have had Leonid Brezhnev threatening nuclear war, the other end of the help line just has a soft voice eager to help you sort out your AOL bill or collaborate with you on a new piece of software. No, that voice has none of the menace of Nikita Khrushchev pounding a shoe on the table at the United Nations, and it has none of the sinister snarl of the bad guys in "From Russia With Love." No, that voice on the help line just has a friendly Indian lilt that masks any sense of threat or challenge. It simply says: "Hello, my name is Rajiv. Can I help you?"

No, Rajiv, actually you can't. When it comes to responding to the challenges of the flat world, there is no help line we can call. We have to dig into ourselves. We in America have all the basic economic and educational tools to do that. But we have not been improving those tools as much as we should. That is why

we are in what Shirley Ann Jackson, the 2004 president of the American Association for the Advancement of Science and president of Rensselaer Polytechnic Institute, calls a "quiet crisis" -- one that is slowly eating away at America's scientific and engineering base.

"If left unchecked," said Jackson, the first African-American woman to earn a Ph.D. in physics from M.I.T., "this could challenge our pre-eminence and capacity to innovate." And it is our ability to constantly innovate new products, services and companies that has been the source of America's horn of plenty and steadily widening middle class for the last two centuries. This quiet crisis is a product of three gaps now plaguing American society. The first is an "ambition gap." Compared with the young, energetic Indians and Chinese, too many Americans have gotten too lazy. As David Rothkopf, a former official in the Clinton Commerce Department, puts it, "The real entitlement we need to get rid of is our sense of entitlement." Second, we have a serious numbers gap building. We are not producing enough engineers and scientists. We used to make up for that by importing them from India and China, but in a flat world, where people can now stay home and compete with us, and in a post-9/11 world, where we are insanely keeping out many of the first-round intellectual draft choices in the world for exaggerated security reasons, we can no longer cover the gap. That's a key reason companies are looking abroad. The numbers are not here. And finally we are developing an education gap. Here is the dirty little secret that no C.E.O. wants to tell you: they are not just outsourcing to save on salary. They are doing it because they can often get better-skilled and more productive people than their American workers.

These are some of the reasons that Bill Gates, the Microsoft chairman, warned the governors' conference in a Feb. 26 speech that American high-school education is "obsolete." As Gates put it: "When I compare our high schools to what I see when I'm traveling abroad, I am terrified for our work force of tomorrow. In math and science, our fourth graders are among the top students in the world. By eighth grade, they're in the middle of the pack. By 12th grade, U.S. students are scoring near the bottom of all industrialized nations. . . . The percentage of a population with a college degree is important, but so are sheer numbers. In 2001, India graduated almost a million more students from college than the United States did. China graduates twice as many students with bachelor's degrees as the U.S., and they have six times as many graduates majoring in engineering. In the international competition to have the biggest and best supply of knowledge workers, America is falling behind."

We need to get going immediately. It takes 15 years to train a good engineer, because, ladies and gentlemen, this really is rocket science. So parents, throw away the Game Boy, turn off the television and get your kids to work. There is no sugar-coating this: in a flat world, every individual is going to have to run a little faster if he or she wants to advance his or her standard of living. When I was growing up, my parents used to say to me, "Tom, finish your dinner -- people in China are starving." But after sailing to the edges of the flat world for a year, I am now telling my own daughters, "Girls, finish your homework -- people in China and India are starving for your jobs."

I repeat, this is not a test. This is the beginning of a crisis that won't remain quiet for long. And as the Stanford economist Paul Romer so rightly says, "A crisis is a terrible thing to waste."

Thomas L. Friedman is the author of "The World Is Flat: A Brief History of the Twenty-First Century," published in mid April by Farrar, Straus & Giroux and from which this article is adapted.

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